Why use negative voltage

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Though many useful and even high-performance devices can be designed and implemented without negative voltages, understanding negative voltage is key to understanding voltage in general, and most people who work with electronics will eventually encounter a circuit that requires a negative-voltage power supply (Figure 1).

Say there"s an electrical potential drop from 5V to 3V. A positive test charge q would add -2q to its potential energy (becoming less positive), while a negative test charge -q would accelerate in the other direction (+2V, from 3V to 5V), but also adding -2q to its potential energy (becoming more negative).

Negative voltage in a circuit is voltage that is more negative in polarity than the ground of the circuit. A voltage source has positive or negative polarity depending on its orientation in a circuit.

Someone may have better words to explain this than me, but the big thing you have to remember is voltage is a potential difference. In most cases the "difference" part is a difference between some potential and ground potential. When someone says -5v, they"re saying that you are below ground.

You also need to keep in mind that voltage is relative. So like I mentioned before, most people reference to "ground"; but what is ground? You can say ground is earth ground, but what about the case when you have a battery powered device that has no contact to ground. In this situation we have to treat some arbitrary point as "ground". Usually the negative terminal on the battery is what we consider from this reference.

Voltage works the same way. The negative sign is just a convention, in the same way that the car has the same height, regardless of which way you measure it. Flip your multimeter leads, and the negative sign will disappear.

An alternating voltage, such as the a.c mains supply, swings positive and negative with respect to the neutral line, which is very close to the earth potential, so "neutral" is regarded as at zero voltage.

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